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**Design and construction of backfills for  
railway track transition zones**Andre Paixao [apaixao@lnec.pt](mailto:apaixao@lnec.pt)

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**Abstract**

The initial geometry of a railway track continually degrades over its life-cycle. Changes in the track alignment give rise to variations in the dynamic axle load which accelerate track degradation, with consequences for maintenance and availability of the line. This behaviour is particularly evident at some critical locations that are associated with abrupt changes in the track's vertical stiffness, such as transitions to bridges or other structures. In order to mitigate this problem, careful design and construction is required, for which several recommendations have been suggested in the literature. However, studies based on the maintenance records of existing high-speed lines have shown that the problem of track degradation associated with stiffness variations is far from being solved. This paper presents a short review on the design of transition zones. A case study on the design and construction of a transition zone on a new Portuguese railway line is analysed. Results of conventional laboratory and cyclic load triaxial testing on granular materials and in situ mechanical characterization of the layers are presented. Relevant aspects regarding the construction are addressed and discussed. The results obtained at the substructure level seem to indicate that the design of the transition zone was successful in minimizing settlement and achieving a gradual stiffness increase as a bridge is approached.